

PROJECT NOTE

TO: Project File

SUBJECT: Jard Company, Inc.

TASK DESCRIPTION: Top of the Stream Surface Water Elevation Calculations for SWP

TDD NO.: 13-09-0001

W.O. NO.: 20114-091-998-0904

TASK NO.: 60

DATE: 8 October 2013

PREPARED BY: John F. Kelly

This project note explains how the “Top of the Stream Surface Water Elevation” is calculated for the Jard HRS Documentation Record using the data from The Johnson Company, 2010 “Limited Phase II Environmental Site Assessment, Former Jard Company Site, Bowen Road, Bennington, Vermont” (HRS Reference 65) and the 2012 “Groundwater Sampling, Former Jard Company Site, Bennington, Vermont” (HRS Reference 68) reports for piezometers located at “Duck Pond” (PZ-13) and “Greene Pond” (PZ-14).

The Johnson Company 2010 Report states that nine piezometers were installed during the weeks of July 26, August 2, and August 23, 2010. Piezometers consisted of a 0.5-foot stainless steel screen (Solinst Model 615) connected to a 5-foot length of 0.5-inch inner diameter polyethylene tubing, within a 5-foot length of 0.75-inch diameter iron pipe. A manual slide hammer was used to drive the piezometer until the top of the screen was approximately 2 feet (ft.) below the bed of the stream or pond. An electronic water level indicator was used to measure the depth to water inside the polyethylene tubing and outside the metal pipe on July 27, July 28, July 29, August 6, and August 30, 2010.

Field data from The Johnson Company 2010 report is summarized in Tables 3 and 4 (see Attachment A). Table 3, “Potentiometric Data Former Jard Company Site, Bennington, Vermont” presents that measured groundwater elevations and Table 4, “Piezometer Water Level Measurements, Former Jard Company Site, Bennington, Vermont” presents the measured depths to water inside and outside the installed piezometers.

Data from Table 3 indicates that the location of piezometer PZ-13 top of casing elevation was surveyed by a licensed surveyor, Guntlow & Associates, Inc., and has an elevation of 657.20 ft. above mean sea level (amsl). Table 3 further notes that on 20 August 2010 (8/30/10) the depth to water in PZ-13 was measured to be equals 1.01 ft. and the Water Level Elevation in the piezometer was 656.19 ft. amsl.

Data from Table 4, indicates the depth to water in PZ-13 was measured to be equals 1.01 ft. and that the depth to water in the stream at PZ-13 was measured to be equals 1.64 ft. from the top of casing. The stream surface elevation for PZ-13 is calculated using the measured elevation of the top of casing elevation for PZ-13 (previously surveyed) and subtracting measured distance from the top of casing to the surface of water in stream:

Elevation of Top of Casing minus (-) Measured Distance from the Top of Casing to the Surface of Water in Stream equal (=) Stream Surface Elevation

Or

$$657.20 \text{ ft. amsl} - 1.64 \text{ ft.} = 655.56 \text{ ft. amsl.}$$

Using this same calculation method and the available data from Tables 3 and 4, the stream surface elevation for PZ-14 was calculated to be equal to 658.12 ft. amsl.

The Johnson Company "October 2012 Groundwater Sampling Former Jard Company Site, Bennington, Vermont" report provides field measurements conducted on 17 October 2012 which are used to calculate the Stream Surface Water Elevation for PZ-13 and PZ-14 4 (see Attachment A). Using this same calculation method as above and the available measurements from 17 October 2012, summarized on the non-labeled Tables located on pages 7 and 8 of 2012 The Johnson Report, the Stream Surface Water Elevation for piezometers PZ-13 and PZ-14 are calculated. See summary data below.

Summary of Johnson Company Measurements and Elevation Determinations/calculations:**8/30/10 Johnson Company Measurements and Calculations:****PZ-13 (Duck Pond)**

Top of Casing Elevation: 657.20 above mean sea level (amsl)

Depth to Water in Piezometer (ft.): 1.01

Water Level Elevation: 656.19 amsl

Depth to Water in Stream (Pond) (ft.): 1.64

Stream Surface Water Elevation: **655.56 amsl** ($657.20 \text{ ft. amsl} - 1.64 \text{ ft.} = 655.56 \text{ ft. amsl.}$)**PZ-14 (Greene Pond)**

Top of Casing Elevation: 660.69 amsl

Depth to Water in Piezometer (ft.): 2.13

Water Level Elevation: 658.56 amsl

Depth to Water in Stream (Pond) (ft.): 2.57

Stream Surface Water Elevation: **658.12 amsl** ($660.69 \text{ ft. amsl} - 2.57 \text{ ft.} = 658.12 \text{ ft. amsl.}$)**10/17/12 Johnson Company Measurements and Calculations:****PZ-13 (Duck Pond)**

Top of Casing Elevation: 657.20 amsl

Depth to Water in Piezometer (ft.): 0.98

Water Level Elevation: 656.22 amsl

Depth to Water in Stream (Pond) (ft.): 1.74

Stream Surface Water Elevation: **655.46 amsl** ($657.20 \text{ ft. amsl} - 1.74 \text{ ft.} = 655.46 \text{ ft. amsl.}$)**PZ-14 (Greene Pond)**

Top of Casing Elevation: 660.69 amsl

Depth to Water (ft.): 2.12

Water Level Elevation: 658.57 amsl

Depth to Water in Stream (Pond) (ft.): 2.82

Stream Surface Water Elevation: **657.87 amsl** ($660.69 \text{ ft. amsl} - 2.82 \text{ ft.} = 657.87 \text{ ft. amsl.}$)



Superfund Technical Assessment and Response Team III (START)

Attachment A

Table 3
Potentiometric Data
Former Jard Company Site
Bennington, Vermont

Location	Top of Casing Elevation (ft.) (1)	7/29/2010		8/6/2010		8/30/2010	
		DTW (ft.)	Elevation (ft.)	DTW (ft.)	Elevation (ft.)	DTW (ft.)	Elevation (ft.)
EPA-2	684.40	Dry	< 679.70	Dry	< 679.70	Dry	< 679.70
EPA-3	687.11	9.56	677.55	9.11	678.00	10.06	677.05
EPA-4	685.88	8.80	677.08	8.44	677.44	9.24	676.64
EPA-5	686.01	<i>inaccessible</i>		<i>inaccessible</i>		<i>destroyed</i>	
EPA-6	683.72	21.74	<i>not available (3)</i>	21.31	<i>not available (3)</i>	9.36	674.36
EPA-7	683.15	<i>inaccessible</i>		<i>inaccessible</i>		10.87	672.28
EPA-8	678.50	<i>inaccessible</i>		<i>inaccessible</i>		8.05	670.45
EPA-9	683.91	Dry	< 672.39	10.97	672.94	Dry	< 672.39
EPA-10	684.23	10.34	673.89	10.00	674.23	10.76	673.47
MW-1	680.05	9.26	670.79	9.05	671.00	9.80	670.25
MW-2	684.68	7.44	677.24	6.91	677.77	8.06	676.62
MW-3	685.75	8.78	676.97	<i>not measured (2)</i>		9.37	676.38
MW-3D	686.29	<i>not constructed</i>		9.69	676.60	10.57	675.72
MW-4	683.94	7.50	676.44	7.05	676.89	8.20	675.74
MW-4D	683.91	<i>not constructed</i>		8.46	675.45	9.51	674.40
MW-6	682.64	11.17	671.47	11.07	671.57	11.87	670.77
MW-6D	682.82	<i>not constructed</i>		11.52	671.30	12.29	670.53
MW-7	670.53	<i>not constructed</i>		3.91	666.62	4.77	665.76
MW-8	670.60	<i>not constructed</i>		5.26	665.34	5.86	664.74
MW-9	669.43	<i>not constructed</i>		<i>not constructed</i>		4.69	664.74
MW-9D	669.34	<i>not constructed</i>		<i>not constructed</i>		5.12	664.22
MW-10	666.91	<i>not constructed</i>		2.15	664.76	2.66	664.25
MW-11	667.23	<i>not constructed</i>		1.51	665.72	1.96	665.27
MW-12	670.05	<i>not constructed</i>		4.08	665.97	4.35	665.70
MW-13	664.03	<i>not constructed</i>		5.61	658.42	5.70	658.33
PZ-01	687.75	2.68	685.07	1.92	685.83	4.32	683.43
PZ-02	<i>not measured (4)</i>	<i>not constructed</i>		2.14	<i>not available (4)</i>	<i>destroyed</i>	
PZ-03	678.20	2.83	675.37	2.59	675.61	3.58	674.62
PZ-04	664.06	2.97	661.09	2.44	661.62	3.40	660.66
PZ-05	661.25	2.43	658.82	2.03	659.22	2.73	658.52
PZ-06	654.28	3.28	651.00	2.85	651.43	3.69	650.59
PZ-12	666.95	<i>not constructed</i>		2.52	664.43	2.87	664.08
PZ-13	657.20	<i>not constructed</i>		0.98	656.22	1.01	656.19
PZ-14	660.69	<i>not constructed</i>		<i>not constructed</i>		2.13	658.56

- 1) Surveyed by Guntlow & Associates, Inc. licensed surveyor
- 2) Not measured due to suspected potential for presence of non-aqueous phase liquid (NAPL).
- 3) Elevation not available due to change in top-of casing elevation between time of measurement and time of survey.
- 4) Elevation not available; location destroyed prior to survey.

Table 4
Piezometer Water Level Measurements
Former Jard Company Site
Bennington, Vermont

The Johnson Company

Event 1: 7/27/2010			
Location	Depth to Water in Piezometer (feet)	Depth to Water in Stream (feet)	Inferred Vertical Groundwater Flow Direction
PZ-01	2.74	2.59	↓
PZ-02	<i>not yet constructed</i>		
PZ-03	2.77	2.43	↓
PZ-04	2.90	3.00	↑
PZ-05	2.36	2.33	↓
PZ-06	3.21	2.83	↓
PZ-12	<i>not yet constructed</i>		
PZ-13	<i>not yet constructed</i>		
PZ-14	<i>not yet constructed</i>		

Event 2: 7/28/2010			
Location	Depth to Water in Piezometer (feet)	Depth to Water in Stream (feet)	Inferred Vertical Groundwater Flow Direction
PZ-01	2.64	2.74	↑
PZ-02	<i>not yet constructed</i>		
PZ-03	2.85	2.57	↓
PZ-04	3.02	3.12	↑
PZ-05	2.44	2.44	-
PZ-06	3.31	2.95	↓
PZ-12	<i>not yet constructed</i>		
PZ-13	<i>not yet constructed</i>		
PZ-14	<i>not yet constructed</i>		

Event 3: 7/29/2010			
Location	Depth to Water in Piezometer (feet)	Depth to Water in Stream (feet)	Inferred Vertical Groundwater Flow Direction
PZ-01	2.68	2.68	-
PZ-02	<i>not yet constructed</i>		
PZ-03	2.83	2.56	↓
PZ-04	2.97	3.05	↑
PZ-05	2.43	2.39	↓
PZ-06	3.28	2.91	↓
PZ-12	<i>not yet constructed</i>		
PZ-13	<i>not yet constructed</i>		
PZ-14	<i>not yet constructed</i>		

Event 4: 8/6/2010			
Location	Depth to Water in Piezometer (feet)	Depth to Water in Stream (feet)	Inferred Vertical Groundwater Flow Direction
PZ-01	1.92	2.02	↑
PZ-02	2.14	2.05	↓
PZ-03	2.59	2.24	↓
PZ-04	2.44	2.59	↑
PZ-05	2.03	2.92	↑
PZ-06	2.85	2.46	↓
PZ-12	2.52	2.78	↑
PZ-13	0.98	1.83	↑
PZ-14	<i>not yet constructed</i>		

Event 5: 8/30/2010			
Location	Depth to Water in Piezometer (feet)	Depth to Water in Stream (feet)	Inferred Vertical Groundwater Flow Direction
PZ-01	4.32	4.02	↓
PZ-02	<i>destroyed</i>		
PZ-03	3.58	2.82	↓
PZ-04	3.40	dry (> 3.47)	↑
PZ-05	2.73	dry (> 2.82)	↑
PZ-06	3.69	dry (> 3.15)	unknown
PZ-12	2.87	2.70	↓
PZ-13	1.01	1.64	↑
PZ-14	2.13	2.57	↑

Notes:
 ↑ Indicates discharge of groundwater to surface water.
 ↓ Indicates recharge of groundwater by surface water.



Superfund Technical Assessment and Response Team III (START)

Attachment B

Location	Interval	Top of Casing Elevation (ft.) (1)	7/29/2010		8/6/2010		8/30/2010		4/18/2012		10/17/2012	
			DTW (ft.)	Elevation (ft.)	DTW (ft.)	Elevation (ft.)	DTW (ft.)	Elevation (ft.)	DTW (ft.)	Elevation (ft.)	DTW (ft.)	Elevation (ft.)
EPA-3	Shallow	687.11	9.56	677.55	9.11	678.00	10.06	677.05	10.98	676.13	10.40	676.71
EPA-9	Shallow	683.91	Dry	< 672.39	10.97	672.94	Dry	< 672.39	Dry	< 672.39	Dry	< 672.39
EPA-100	Deep	683.06	not constructed		not constructed		not constructed		not constructed		9.52	673.54
EPA-101	Deep	665.23	not constructed		not constructed		not constructed		not constructed		7.04	658.19
EPA-102	Deep	658.98	not constructed		not constructed		not constructed		not constructed		6.73	652.25
EPA-103	Deep	652.73	not constructed		not constructed		not constructed		not constructed		8.59	644.14
EPA-104S	Shallow	654.80	not constructed		not constructed		not constructed		not constructed		4.40	650.40
EPA-104D	Deep	654.54	not constructed		not constructed		not constructed		not constructed		4.24	650.30
EPA-105	Deep	646.35	not constructed		not constructed		not constructed		not constructed		7.81	638.54
EPA-106S	Shallow	653.70	not constructed		not constructed		not constructed		not constructed		4.43	649.27
EPA-106D	Deep	653.40	not constructed		not constructed		not constructed		not constructed		4.23	649.17
EPA-107	Deep	650.01	not constructed		not constructed		not constructed		not constructed		2.75	647.26
EPA-108S	Shallow	665.47	not constructed		not constructed		not constructed		not constructed		6.23	659.24
EPA-108D	Deep	665.71	not constructed		not constructed		not constructed		not constructed		6.35	659.36
MW-1	Shallow	680.05	9.26	670.79	9.05	671.00	9.80	670.25	10.60	669.45	9.80	670.25
MW-2	Shallow	684.68	7.44	677.24	6.91	677.77	8.06	676.62	8.77	675.91	8.05	676.63
MW-3	Shallow	685.75	8.78	676.97	not measured (2)		9.37	676.38	10.43	675.32	9.82	675.93
MW-3D	Deep	686.29	not constructed		9.69	676.60	10.57	675.72	11.68	674.61	11.00	675.29
MW-4	Shallow	683.94	7.50	676.44	7.05	676.89	8.20	675.74	8.87	675.07	8.12	675.82
MW-4D	Deep	683.91	not constructed		8.46	675.45	9.51	674.40	10.43	673.48	9.50	674.41
MW-6	Shallow	682.64	11.17	671.47	11.07	671.57	11.87	670.77	13.21	669.43	12.31	670.33
MW-6D	Deep	682.82	not constructed		11.52	671.30	12.29	670.53	13.30	669.52	12.46	670.36
MW-8	Shallow	670.60	not constructed		5.26	665.34	5.86	664.74	6.87	663.73	6.00	664.60
MW-9	Shallow	669.43	not constructed		not constructed		4.69	664.74	5.60	663.83	4.54	664.89
MW-9D	Deep	669.34	not constructed		not constructed		5.12	664.22	6.04	663.30	5.02	664.32
MW-10	Shallow	666.91	not constructed		2.15	664.76	2.66	664.25	3.28	663.63	2.42	664.49
MW-11	Shallow	667.23	not constructed		1.51	665.72	1.96	665.27	2.36	664.87	1.77	665.46
MW-12	Shallow	670.05	not constructed		4.08	665.97	4.35	665.70	4.48	665.57	4.22	665.83
MW-13	Shallow	664.03	not constructed		5.61	658.42	5.70	658.33	6.04	657.99	5.66	658.37
PZ-12	Shallow	666.95	not constructed		2.52	664.43	2.87	664.08	3.70	663.25	2.49	664.46
PZ-13	Shallow	657.20	not constructed		0.98	656.22	1.01	656.19	1.03	656.17	0.98	656.22
PZ-14	Shallow	660.69	not constructed		not constructed		2.13	658.56	2.66	658.03	2.12	658.57
PZ-15	Shallow	662.52	not constructed		not constructed		not constructed		not constructed		1.68	660.84
PZ-16	Shallow	649.51	not constructed		not constructed		not constructed		not constructed		2.14	647.37
PZ-17	Shallow	666.68	not constructed		not constructed		not constructed		not constructed		3.11	663.57
PZ-18	Shallow	654.21	not constructed		not constructed		not constructed		not constructed		3.01	651.20
PZ-19	Shallow	652.74	not constructed		not constructed		not constructed		not constructed		3.88	648.86
PZ-20	Shallow	647.18	not constructed		not constructed		not constructed		not constructed		2.62	644.56
PZ-21	Shallow	645.06	not constructed		not constructed		not constructed		not constructed		2.58	642.48
PZ-101	Shallow	685.87	not constructed		not constructed		not constructed		not constructed		3.01	682.86
PZ-102	Shallow	680.78	not constructed		not constructed		not constructed		not constructed		3.20	677.58
PZ-103	Shallow	not measured (4)	not constructed		not constructed		not constructed		not constructed		2.35	not available (4)
PZ-104	Shallow	666.63	not constructed		not constructed		not constructed		not constructed		3.13	663.50
PZ-105	Shallow	660.27	not constructed		not constructed		not constructed		not constructed		2.31	657.96
PZ-106	Shallow	650.85	not constructed		not constructed		not constructed		not constructed		2.31	648.54
PZ-107	Shallow	644.07	not constructed		not constructed		not constructed		not constructed		1.45	642.62

- 1) Surveyed by Guntflow & Associates, Inc.; Weston Solutions, Inc.; and The Johnson Company, Inc.
- 2) Not measured due to suspected potential for presence of non-aqueous phase liquid (NAPL).
- 3) Elevation not available due to change in top-of casing elevation between time of measurement and time of survey.
- 4) Elevation not available; location destroyed prior to survey.

Location	Description	Depth to Water in Piezometer (feet)	Depth to Water outside Piezometer (feet)	Inferred Vertical Groundwater Flow Direction
PZ-12	Unnamed stream west of 222 Bowen Road	2.49	2.72	↑
PZ-13	East end of Duck Pond	0.98	1.74	↑
PZ-14	Park Street road ditch	2.12	2.82	↑
PZ-15	Apparent groundwater discharge area east of beaver pond adjacent to 78 Bowen Road parking lot	1.68	2.08	↑
PZ-16	Southern edge of pond between Park Street and 78 Bowen Road	2.14	2.64	↑
PZ-17	Apparent groundwater discharge area north of Bowen Road, between Plasan facilities	3.11	3.32	↑
PZ-18	Apparent groundwater discharge area near eastern edge of wetland area	3.01	2.82	↓
PZ-19	Within flowing water, in wetland area	3.88	2.85	↓
PZ-20	Apparent groundwater discharge area in wetlands	2.62	2.88	↑
PZ-21	Within stream, at edge of wetland area	2.58	2.89	↑
PZ-101	North side of Roaring Branch, replacement of PZ-01	3.01	2.63	↓
PZ-102	North side of Roaring Branch, replacement of PZ-02	3.20	2.60	↓
PZ-103	North side of Roaring Branch, replacement of PZ-03	2.35	2.15	↓
PZ-104	North side of Roaring Branch, replacement of PZ-04	3.13	2.75	↓
PZ-105	North side of Roaring Branch at Park Street Bridge, replacement of PZ-05	2.31	2.12	↓
PZ-106	South side of Roaring Branch, replacement of PZ-06	2.31	2.30	↓
PZ-107	North side of Roaring Branch, most downstream location	1.45	1.55	↑

Notes:



Indicates discharge of groundwater to surface water.

Indicates recharge of groundwater by surface water.